INTERNATIONAL STANDARD

ISO 17743

First edition
2016-06-01

Energy savings — Definition of a methodological framework applicable to calculation and reporting on energy savings

Économies d'énergie — Définition d'un cadre méthodologique pour le calcul et la déclaration des économies d'énergies

Reference number
ISO 17743:2016(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

The committee responsible for this document is ISO/TC 257, *Evaluation of energy savings*.

Introduction

This International Standard aims to provide standards used to determine the energy savings covering regions, cities, organizations and projects.

This International Standard provides a framework with definitions, types of information used to evaluate the energy savings in order to enable consistency for the standards developed by ISO/TC 257.

Figure 1 illustrates the relationship between the different working groups of ISO/TC 257, as well as ISO 50015, developed by ISO/TC 242 which is about energy management.

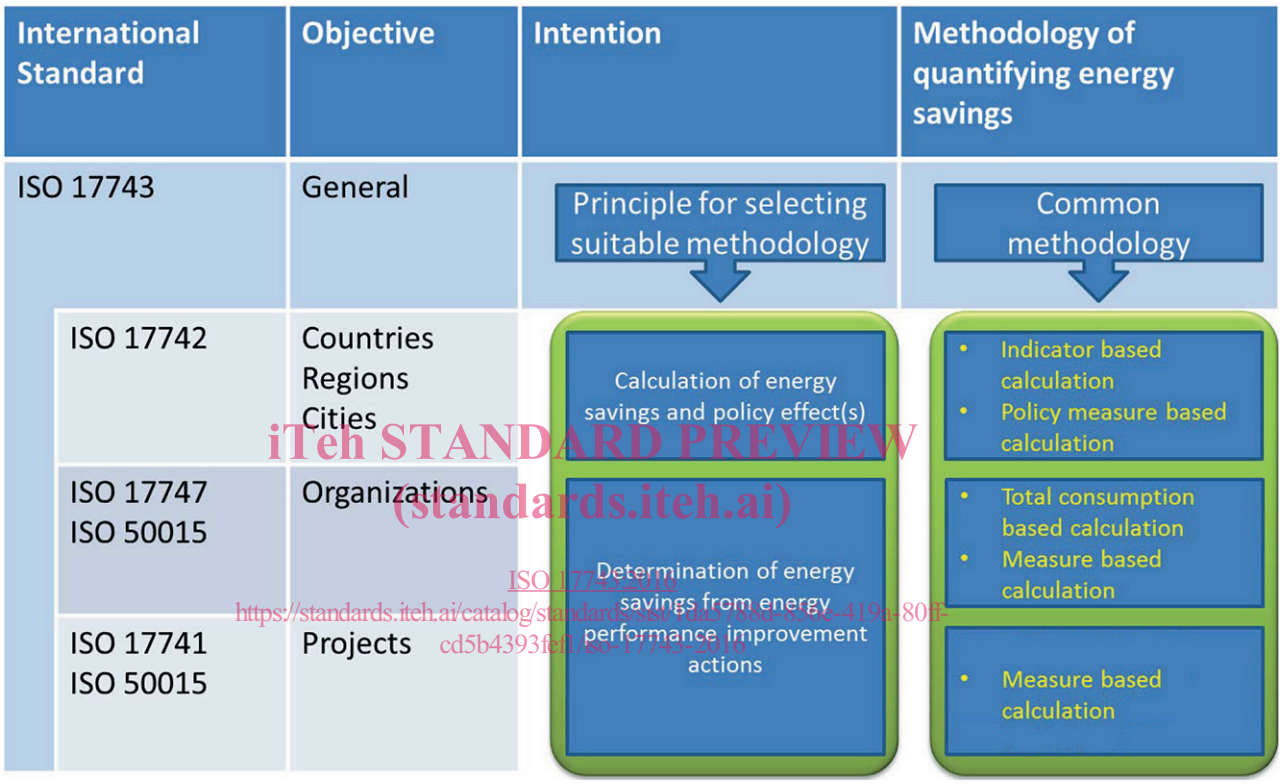

Figure 1 — Work programme of ISO TC 257

This International Standard may be used by any stakeholder (policy maker, decision maker, company, organization, NGOs, etc.) that aims to determine energy savings.

Energy savings — Definition of a methodological framework applicable to calculation and reporting on energy savings

1 Scope

This International Standard establishes a methodological framework that applies to the calculation and reporting of energy savings from existing (implemented) and prospective measures and actions which intend to save energy. This framework standard will be applicable to other standards in the field of energy saving determination.

This International Standard addresses the following in the context of energy savings:

— terminology;

— definition of the system boundaries;

— principles for the determination of a baseline;

— principles for statistical indicator-based methods;

— data used;

— principles for reporting.

The development of the methodology for measurement and verification of the energy savings is not in the scope of this International Standard.

The methodology of construction of the scenarios for future energy saving measures and actions is not in the scope of this International Standard.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
baseline period
specific period of time before the implementation of *energy performance improvement action* (3.7) selected for the comparison with the *reporting period* (3.11) and the calculation of *energy savings* (3.9)

[SOURCE: ISO/IEC 13273-1:2015, 3.3.8.1, modified — “energy performance” replaced by “energy savings” and deleted “and of energy performance improvement action”]

3.2
energy
capacity of a system to produce external activity or to perform work

Note 1 to entry: Commonly, the term energy is used for electricity, fuel, steam, heat, compressed air and other like media.

Note 2 to entry: Energy is commonly expressed as a scalar quantity.

Note 3 to entry: Work, as used in this definition, means external supplied or extracted energy to a system. In mechanical systems, forces in or against direction of movement; in thermal systems, heat supply or heat removal.

Note 4 to entry: In the International Systems of Units, the reference unit for energy is Joule (J).

[SOURCE: ISO 13273-1:2015, 3.1.1, modified — added Note 4 to entry]

3.3
energy baseline
quantitative reference(s) providing a basis for comparison of *energy performance* (3.6)

Note 1 to entry: An energy baseline usually reflects a specified period of time.

Note 2 to entry: An energy baseline can be adjusted using variables which affect energy use and/or consumption, e.g. production level, degree days (outdoor temperature), occupancy period, etc.

Note 3 to entry: The energy baseline is also used for calculation of energy savings, as a reference before and after implementation of energy performance improvement actions.

[SOURCE: ISO 50001:2011, 3.6]

3.4
energy consumption
quantity of *energy* (3.2) applied

Note 1 to entry: Energy consumption can be determined with and without or before and after any energy performance improvement action.

[SOURCE: ISO 50001:2011, 3.7, modified — added Note 1 to entry]

3.5
energy end-user
individual or a group of individuals or organization with responsibility for operating an energy using system

Note 1 to entry: The energy end-user may differ from the customer who might purchase the energy but does not necessarily use it.

[SOURCE: ISO 13273-1:2015, 3.1.10, modified — added Note 1 to entry]

3.6
energy performance
measurable results related to energy efficiency, energy use, and *energy consumption* (3.4)

[SOURCE: ISO 13273-1:2015, 3.3.1]

3.7
energy performance improvement action
EPIA
action or measure (or group of actions or measures) implemented or planned within an organization intended to achieve energy performance improvement through technological, management, behavioural, economic or other changes

Note 1 to entry: EPIAs are also applicable at project level or country, regions and city level.

Note 2 to entry: In the context of energy savings calculation, EPIAs are generally concerned with energy efficiency.

Note 3 to entry: In some International Standards, “elementary unit of action” is used instead of EPIA.

[SOURCE: ISO 13273-1:2015, 3.3.7, modified — added Note 1 to entry, Note 2 to entry and Note 3 to entry]

3.8
energy savings
reduction of *energy consumption* (3.4) compared to an energy baseline

Note 1 to entry: Energy savings can be actual (realized) or expected (predicted).

Note 2 to entry: Energy savings may be the result of implementation of an EPIA (energy performance improvement action) or autonomous progress.

3.9
energy using system
physical items with defined system boundaries, using *energy* (3.2)

EXAMPLE Facility, building, part of a building, machine, equipment, product, etc.

[SOURCE: ISO 13273-1:2015, 3.1.9]

3.10
adjusted energy savings
energy savings with use of adjustment(s)

Note 1 to entry: The difference in energy consumption with and without or before and after the energy performance improvement action(s) with the use of adjustment(s).

3.11
reporting period
defined period of time selected for determination and reporting of energy savings

[SOURCE: ISO 50006:2014, 3.15, modified, "calculation" replaced by "determination" and "energy performance" replaced by "energy savings"]

3.12
routine adjustment

determinable adjustment made to energy consumption to account for changes in relevant variables according to a predetermined method

Note 1 to entry: In some International Standards, the term "normalization" is used in preference to "routine adjustement", in order to enable different methods of adjustment (commonly based on reference conditions, baseline period conditions or reporting period conditions) to be distinguished.

[SOURCE: ISO 50015:2014, 3.20, modified — "determinable" and Note 1 to entry added and "energy baseline" replaced by "energy consumption"]

3.13
unadjusted energy savings
energy savings (3.8) without any adjustment

4 Energy savings and methods for determination

4.1 General

The choice for the method for calculating and reporting energy savings should be suitable for the intended use of the results. There are three main methods:

— statistical indicator-based method[2][8];

— measure-based method, including EPIA based methods[1][3][8];

— total consumption-based method[3].

The statistical indicator-based method starts from indicators that relate energy consumption to a relevant variable (driver). The change in this efficiency indicator is used to calculate savings, by multiplying it with the value of the relevant variable (driver).

The measure-based method, including EPIA-based methods, aggregates energy savings calculated for each EPIA or other measure implemented.

Total consumption-based method starts from the change in measured energy consumption between the baseline period and the reporting period.

4.2 Principles

This framework standard introduces the key concepts for calculating energy savings. Energy savings will be determined as a difference in energy consumption with and without or before and after the energy performance improvement action(s).

Energy savings are dependent on the system boundary being considered.

If an energy performance improvement action results in an increase in the energy consumption, then the energy savings are negative.

This Clause describes the different characteristics of methods as to the following:

— energy savings (4.3);

— system boundary(s) (4.4);

— energy baseline and adjustment of energy savings (4.5 to 4.6).

4.3 Energy savings

Energy savings may result from the following:

— facilitating measures intended to encourage an end-user action;

— EPIAs independently taken by energy end-users;

— autonomous progress, other market changes or policies that arise without end-user actions intended to save energy (these are described in more detail in 4.6.3.3).

Facilitating measures, such as regulation, subsidy schemes or voluntary agreements, may encourage energy end-users to implement energy performance improvement actions. Facilitating measures do not by themselves result directly in energy savings.

EXAMPLES Minimum energy efficiency performance standards for refrigerators, power transformers and appliance in general, tax reduction for efficient car, subsidized loans for higher efficiency industrial electric motors and voluntary agreements with manufacturers to reduce standby energy consumption of televisions.

Energy end-users may take actions that lead to energy savings. These actions are known as energy performance improvement actions (EPIAs). The EPIAs may be physical, organizational, or behavioural.

EXAMPLES A physical action may be to replace old refrigerators or power transformers by more efficient ones; an organizational action may be to identify oversized and underloaded electric motors and redistribute the load; a behavioural action may be to apply eco-driving principles.

Statistical indicator-based methods relate energy consumption at an aggregated level (sector, targeted energy use, such as all refrigerators or all electric motors in a country) to one relevant variable (driver) that is (statistically) defining the change in energy consumption. The change in the indicator value is used to calculate the savings. Part of these savings is considered as the result of EPIAs that focus on the energy use covered by the indicator.

EXAMPLE Average floor area of dwellings, energy consumption per m^2 in buildings, average fuel consumption per car.

End-user actions can be the result of facilitating measures but can also be caused by other factors like high energy prices, autonomous progress, market forces or non-energy government policy. The indicator values incorporate the effect of all relevant facilitating measures. However, the indicators can only show their combined effect.

In cases of facilitating measures, the energy savings will be derived from the effect of the end-user actions stimulated (e.g. for energy audits, the end-user actions to implement the energy saving measures mentioned in the audit report). These energy savings can be directly calculated and may or may not be linked to one or more facilitating measures.

For organizations or projects, the change in statistical indicators can be used to calculate energy savings, as well as direct measurements in the considered system.

4.4 System boundary(s)

The system boundary(s) should be established for the entity to which the energy savings apply, such as country, region, city, multi-site company, a project, an organization, a system or a specific appliance.

EXAMPLE System boundary could be limited to all buildings operated by an organization or to a single building.

Allocation rules should be established to avoid double counting of energy savings between different EPIAs that apply within the same boundary. These allocation rules should, when possible, be aligned with the logical order of energy using systems and processes. These allocation rules should be recorded.

EXAMPLE In a building (physical boundary), two actions are implemented, insulation of the building envelope and change of the central heating boiler. Double counting occurs when their interaction is not taken into account. The building's manager will determine the energy savings by firstly considering the energy savings due to improvement of the building envelope and then the savings due to the higher efficiency boiler for the reduced heating load.

4.5 Energy baseline determination

The energy baseline represents the reference situation appropriate to the energy savings determination and should be documented. The choice of this baseline and the baseline period affects the resulting energy savings[4][5].

The energy baseline may be time related (for comparing energy consumption before and after EPIA, see Keys 1 and 2 in Figure 2 below) or case related (for comparing energy consumption with and without EPIA, see Keys 4 and 2 in Figure 2 below).

NOTE 1 Using a representative sample (participating / non-participating) is an illustration of a case-dependant energy baseline.

The relevant variables (e.g. production volume, temperature, building area) affecting energy use or consumption in the baseline period should be documented. If this is different from the service level in the reporting period, then the energy consumption of the baseline period or the reporting period or both should be adjusted to enable a fair comparison to be made. It will be for the person determining the energy savings to decide and report on whether or not adjustement is required, taking into account factors, such as the purpose for which the energy savings are being determined, type of available data and data quality.

There can be multiple types of baseline.

— If the equipment having the average energy performance in the market at reporting period is applied.

— If the equipment having the average energy performance in the market at baseline period was applied.

— The equipment used in the baseline period is still in use.